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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/274,194	03/22/1999	JOHN E. LANG	LAM1P083A	8105

7590

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EXAMINER

BROWN, CHARLOTTE A

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 07/08/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

A-3-11

# Office Action Summary

Application No.  
09/274,194

Applicant(s)  
Lang et al.

Examiner  
Charlotte A. Brown

Art Unit  
1765



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on May 28, 2002
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 20-38 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 20-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_ 6) ☐ Other:

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### DETAILED ACTION

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 20-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobben (US 6,066,569) in view of Kikuchi et al. (US 5,399,202).

Tobben discloses a process for the manufacture of silicon integrated circuits. A silicon substrate is provided. An organic material free of silicon is deposited over the semiconductor substrate. The material can be a parylene. This reads on the applicant's limitation that a low dielectric constant material is disposed over a semiconductor substrate. A hard mask material overlies the low dielectric constant layer. The layer may comprise a single layer of silicon oxide or a dual layer of silicon oxide covered by a layer of silicon nitride. The mask layer is covered by a layer of photoresist that has been patterned to provide an opening (Column 3, lines 10-20). An opening is then etched through the mask layer. The workpiece is subjected to an etch to extend the opening only partly through the mask layer. The original photoresist is stripped (Column 3, lines 21-37).

Unlike the claimed invention, Tobben does not disclose a method wherein the photoresist material is removed with dimethyl sulfoxide.

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Kikuchi discloses a method for peeling a resist layer. A substrate is provided with a photoresist layer. The substrate is immersed in an ultrasonic peeling bath. The peeling liquid is an aprotic solvent of either dimethyl sulfoxide, propylene carbonate, or N-methyl-2-pyrrolidone. The ultrasonic bath is filled with a peeling liquid which is subjected to a temperature adjustment to 60°C. This reads on the applicant's limitation of removing the photoresist layer from over the hard mask layer with dimethyl sulfoxide of a high pressure liquid chromatography (HPLC) grade. The photoresist of the substrate is peeled off while applying ultrasonic waves to the peeling liquid from an ultrasonic generator provided from the bottom of the bath. The substrate is held in the bath for about 30 seconds or less for complete peeling of the photoresist (Column 11, lines 57-68). The photoresist layer is dissolved (Column 21, lines 17-33). This reads on the applicant's limitation of chemically dissolving the photoresist layer from over the hard mask layer.

Unlike the claimed invention, neither Tobben nor Kikuchi teach a method wherein a high selectivity of the dimethyl sulfoxide of HPLC grade toward a low dielectric constant material of the low dielectric constant layer causes the dimethyl sulfoxide to chemically dissolve the photoresist layer from over the hard mask layer without substantially damaging the low dielectric constant layer. Kikuchi does teach that the dimethyl sulfoxide chemically dissolves the photoresist layer. Since the dimethyl sulfoxide layer chemically dissolves the photoresist layer and the same process steps are performed, it is inherent that the dimethyl sulfoxide has a high selectivity toward a low dielectric constant material.

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It is the Examiner's position that a person having ordinary skill in the art would have found it obvious to modify Tobben by immersing the substrate in an ultrasonic bath of dimethyl sulfoxide for removal of the photoresist layer as taught by Kikuchi therein because Tobben is not particular about the stripping process used for removal of the photoresist layer and therefore the use of a resist peeling process would have been anticipated in order to produce an expected result.

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. (US 5,633,175, US 6,020,269, and US 5,883,011)
  
4. Any inquiry concerning this communication from the Examiner should be directed to Charlotte A. Brown whose telephone number is (703) 305-0727. The Examiner can normally be reached during the hours of 9:00AM to 6:30PM.

The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After final communications.

CAB

July 1, 2002

  
**BENJAMIN L. UTECH**  
**SUPERVISORY PATENT EXAMINER**  
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